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Evaluation of e-learning course, Information Literacy, for medical students

Abstract

Purpose – The main goal of this article is to describe and to evaluate the results of evaluation of the e-learning course Information literacy which is taught by the librarians at the Faculty of Medicine, Masaryk University. In the article the results are discussed to inform about the librarians experience with tutoring the course.

Design/methodology/approach – The survey has covered the medical students who enrolled the course between autumn 2008 and autumn 2010. The students were requested to fill the questionnaire designed in Google Documents and based on the quantitative method including a five-point Likert scale combined with closed ended questions and open ended question.

Findings – Results show the medical students are satisfated with the e-learning course Information literacy because of time and space flexibility, studying at their own pace and online interactive tutorials. More than half students found the gradual releasing of the study materials and the tasks as the main motivation for continous learning. Most of the students were satisfied with the taught topics like methodology of searching in the databases Web of Science, Scopus and medical databeses, using EndNoteWeb and citation style ISO 690. Most of the tasks like searching in the online databases, working with EndNoteWeb or finding the impact factor of a journal were evaluated as beneficial.

Practical implications – The results have suggested several important revisions to the e-learning course Information literacy. The librarians have decided to create the interactive tutorials explaining the importance of the topics according to the students' needs in the future and writing a scientific paper and remove the parts of tutorials describing the library terminology and catalogues. Besides this decision two new tasks – verifying online access to the full text of journals and finding signs of plagiarism in a short text – have been added since spring 2011. Finally the librarians will prepare some printed material supporting the course and improve the publicity of their e-learning course among the teachers who can recommend the course to their students.

Originality/value – The article presents one of the first experience with e-learning course Information literacy for medical students in the Czech republic. The results and its discussion can help to other librarians who are going to prepare the similar e-learning course in planning the conception of their course.

Keywords: Academic libraries, Czech republic, e-learning, evaluation, information literacy, librarians, medical students

Paper type: Researcher paper

Introduction

For more than thirty years the information literacy (IL) has been an essential part of education at universities (Pinto *et al.*, 2010). The American Library Association (ALA) defines the information literate person as someone who „*Must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.*"(ACRL, 1989) Increasing IL is the main goal of almost twenty countries that have signed the Prague Declaration and Alexandria Proclamation which were declared in 2003 and 2005 at the seminars endorsed by UNESCO (IFLA, 2005; UNESCO, 2003) During the last decade the role of libraries in IL education has been repeatedly discussed and many studies indicate the library is a significant partner in IL activities at universities (Bailey *et al.*, 2007; Barnard *et al.*, 2005; Childs *et al.*, 2005; Corrall, 2008; Wang and Hwang, 2004). As the title of Prague Declaration implies, the Czech Republic is one of the signatories and the declaration itself is a key document for the Association of Libraries of Czech Universities,

especially for the Information Education and Information Literacy Working Group (IVIG). In 2008 IVIG published the information literacy strategy for the Czech universities (ALCU, 2008) which is based on the Information Literacy Competency Standards for Higher Education (ALA, 2000). The Czech standard describes the information literate university student similarly to the ALA standard and includes additional requirements including mastering their native language in oral and written form and using the terminology in both the native and a foreign language (especially English).

Masaryk University Campus Library (MUCL), where the author of this article is working, as one of the libraries at the Masaryk University (MU), Czech Republic, is also aware of the IL needs. MUCL originated from the integration of the libraries of the Faculty of Medicine (FM), the Faculty of Sport Studies (FSpS) and chemical departments of the Faculty of Science (FS) in 2007. MUCL has followed the IL activities of the libraries FM and FS and each semester holds courses on the IL topics, for instance, searching for information, and the evaluation of that information within the scientometric indicators, publication and citation ethics. Since autumn 2008 MUCL has offered the course VSIV021 Information literacy (VSIV021) as an e-learning course for medical students at FM.

After two and half year the MUCL librarians have decided to evaluate the students' satisfaction with the course in detail. The main goals of the evaluation were getting the information as to whether the medical students were satisfied with the e-learning form of VSIV021, the taught topics, the tasks, and to discover what the factors are that motivate them to continuous learning.

Background

Unfortunately, in the Czech Republic most university teachers consider the librarian as a person loaning books more than a specialist in IL activities. Although this opinion on the status of the librarian is gradually changing, the Czech librarians still have to do all IL activities at the same time as their work at the library including the loaning, cataloguing, referencing etc. The MUCL librarians are also in this situation, however their IL activities are supported by the FS, FSpS and especially by FM. As well as short term IL lessons since 2007 the MUCL librarians tutor three courses at FM:

- DSVIz01 Acquisition of scientific information for Ph.D. students for 5 credits,
- VSIV021 Information literacy for Czech students 2 credits (since spring 2008),
- VSIL021 Information literacy for foreign students for 1 credit (since spring 2010, the course is taught in English).

In 2008 the MUCL librarians transformed VSIV021 into e-learning form for the following reasons:

1) DSVIz01 and VSIV021 had been taught in classical face-to-face (F2F) form which was very time-consuming (the MUCL librarians taught ca. 130 hours a semester). Several studies report online teaching is less time-consuming than F2F and no significant difference in pre-test and final exam scores of the students have been found (Appelt and Pendell, 2010; Kraemer *et al.*, 2007; Nichols *et al.*, 2003; Reynolds *et al.*, 2007; Salisbury and Ellis, 2003; Yu *et al.*, 2007; Zhang *et al.*, 2007). The same experience has been shared by the MUCL librarians' colleagues tutoring the IL course at the Faculty of Education and Faculty of Arts.

2) In the context of the described situation of the Czech librarians, the MUCL librarians were not able to cover the increasing interest of the students in IL activities, Figure 1 shows the number of students enrolled in the courses DSVIz01, VSIV021 and VSIL021. Therefore the e-learning form of VSIV021 seems to cover this interest.

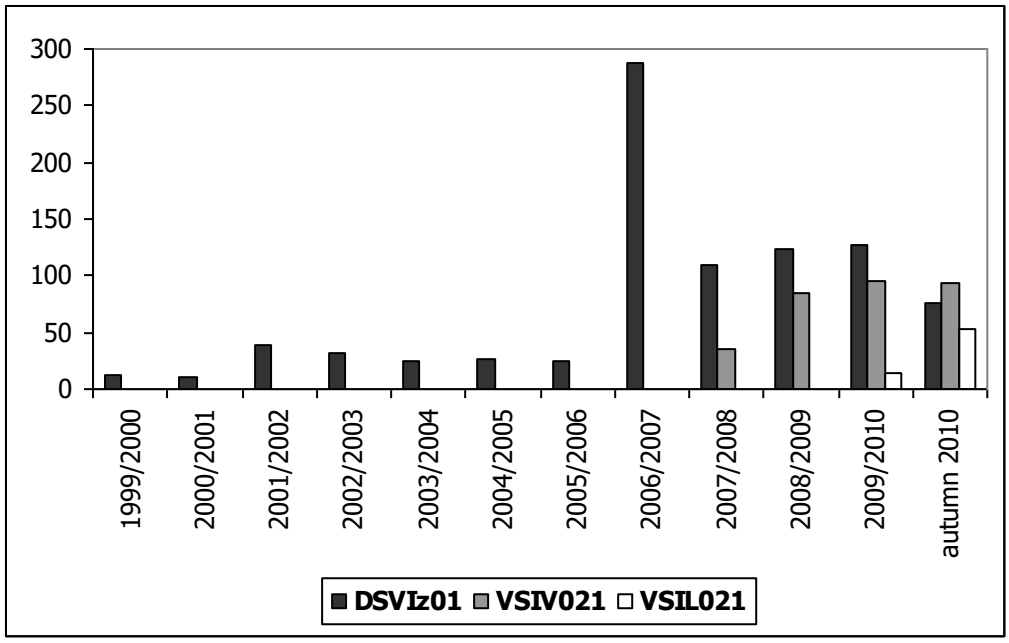

Figure 1 – The number of students enrolled in the courses. The data for 2010/2011 doesn't include the information on spring 2011.

3) Many studies discussed the advantages and disadvantages of e-learning or the requirements of the learning management systems (LMS). Reime, Harris, Aksnes and Mikkelsen describe e-learning "*as a method which integrates information technology and the learning process by using material delivered through the internet to create, foster, deliver and facilitate learning, any time and anywhere*" (Reime *et al.*, 2008). Childs, Blenkinsopp, Hall and Walton argue e-learning education is connected with problems related to copyright and plagiarism, changing the learning style of the learners, lack of motivation and time consumption (Childs *et al.*, 2005). On the other hand Joint reports that online education makes it possible for the students to apply the learned knowledge to real learning tasks, the online study materials "*might be more effective at teaching information literacy rather than information skills*" and the information skills material and curriculum material can be integrated in one place (Joint, 2003). Several studies have summarized the basic requirements of LMS such as a website with the basic information about the course, a study material depository, an application that allows students to search the study materials, a discussion group, chat rooms, blogs, wikis, applications for online examination and testing and scheduling, as well as the need for pedagogical and didactic aspects for the e-learning concept, the necessity of using different didactic methods, the necessity of exploring the quality of the course and study materials and e-learning system availability, and finally the necessity of technical support to manage the course (Conole, 2004; Davis *et al.*, 2008; Ellaway and Masters, 2008; Masters and Ellaway, 2008). In accordance with the outlined reguirements the MUCL librarians have all the necessary requirements to create a quality e-learning course as MU provides full support to e-learning activities. This is related to the MU declaration on the implementation of information technologies and e-learning into education in the university strategic plan (Masarykova univerzita 2005a, 2005b). This declaration is based on the European Parliament and on the Council programme „*for the effective integration of information and communication technologies (ICT) in education and training systems in Europe (eLearning Programme)*" (Council, 2003) which also obligates the Czech Republic as a European Union member. Since this time MU has developed its own LMS (MU LMS) that is completely integrated in the Masaryk University Information System (MU IS) (Brandejsová and Brandejs, 2006; EUNIS, 2005). With the exception of the chat-rooms and

wikis all described requirements on LMS are included in MU LMS and all teachers have full personal and technological support from MU (Brandejsová *et al.*, 2008).

The MUCL librarians have prepared VSIV021 as an e-learning course which has been structured similar to the F2F seminary. It means the Interactive Syllabus, an interactive website integrated in LMS MU, is structured into eleven topics corresponding with the number of weeks per semester. Each topic includes a short annotation describing the taught theme and it is directly connected to discussion groups, study materials and trainings. All topics are configured to become accessible on specific dates and at specific times, which supports continuous study. The potential problem of copyright infringement in the study materials was eliminated by the MUCL librarians' decision to prepare their own interactive tutorials. The tutorials were created in cooperation with MU graphic designers (professionals working with Adobe Captivate, Flash etc.) and include the various teaching techniques like text lectures, training, explanation, practical training etc.

Since autumn 2008 the conception of VSIV021 has been changed several times, especially the tasks set (Table 1). In autumn 2008 the students were motivated toward active study in order to complete three tasks and pass the online test. The tests were on each topic and were available only a few weeks. From spring 2009 to spring 2010 the number of tasks increased to 4 and the continuous tests were replaced by the final test at the end of semester. In autumn 2010 the tests were cancelled and the number of tasks was increased to 7. All these changes are the result of MUCL librarians doing their best to meet the users' needs. MUCL librarians found that all students passed the tests without any problem (from autumn 2008 to spring 2010 only 3 students had to repeat the test). Students wanted the course to be more practical. Of course MUCL librarians realize the main motivation strategies for e-learning like attention, relevance, confidence and satisfaction (Yengin *et al.*, 2010) but in the context of the described conditions in Czech university libraries, they can only gradually innovate the course to the most effective functionality.

View of tasks in the single semester

Title of task	Task description	Autumn 2008	Spring 2009	Autumn 2009	Spring 2010	Autumn 2010
Catalogue and scan	searching a shelf number in online catalogue and scan the title page of found book	-	-	-	-	X
Interlibrary loan	ordering an article via online ILL form	X	X	X	X	X
Search	Searching the articles on student's topic in the Web of Science database	X	X	X	X	X
Metalib	getting the information on article fulltext availabilty via a federated search system Metalib	-	-	-	-	X
Medline	getting the information on article fulltext availabilty via Medline	-	-	-	-	X
EndNoteWeb	importing the references into EndNoteWeb and generating the reference list	X	X	X	X	X
Impact factor	getting the IF of a journal	-	X	X	X	X

Table 1 – A symbol X means the task was included in the semester.

The hypotheses and questionnaire

Since autumn 2008 the MUCL librarians have gotten feedback on VSIV021 from the students through an application Course Opinion Poll (COP) integrated in MU IS. With the application the students can evaluate via a eleven-point scale all university courses, particularly whether the course was interesting, beneficial, hard to prepare for, the content

difficult, if the study materials were highly accessible and if the teacher is a good educator and expert. COP also includes a field for comments. However, the MUCL librarians found COP as an insufficient way to acquire more detailed feedback on the students' satisfaction with VSIV021, therefore in spring 2010 they prepared their own questionnaire the results of which would confirm or defeat the main hypotheses:

- Medical students are satisfied with the e-learning form of VSIV021 because of the flexibility of time and space, the interactive character of the study materials etc.
- The tasks, training and gradual accessing of the study materials are the main motivation factors for students' continous learning.
- Obtaining credits and learning to work with information were the main motivation factors behind the students enrolling in the course.
- Medical students are satisfied with the topics taught.
- All tasks were found to be beneficial.

The questionnaire was designed in Google Documents to collect the following information 1) when the students studied, 2) what motivated the students to continuously study and enrol the course, how they got the information about the course listing, what type of completion they prefer, 3) how the students evaluate e-learning form of VSIV021, 4) which of the topics taught they rate as beneficial for their future studies, 5) which homework they rate as beneficial. 6) The last part of the questionnaire included questions and fields to comment on the teachers, using EndNoteWeb etc.

The quantitative method chosen was a five-point Likert scale where the midpoint 3 indicated a neutral stance (for parts 4-5) this was combined with closed ended questions (yes/no questions and multiple choice) and open ended questions (completely unstructured) (for parts 1-3) in the questionnaire. Each part also contained a field for comments. Because all students passed the courses in almost identical conditions (one task had been added since spring 2009 and a small number of tutorials had been added which were relating to access to a new database) the results were summarized with the exception of the evaluation of tasks. These results were evaluated separately because the groups from autumn 2008 and autumn 2010 had a different number of tasks. The results on the taught topics were summarized into the three groups where the answers "strongly beneficial" and „beneficial" are indicated as „beneficial", the answers „not beneficial" and „strongly not beneficial" are collected in „not benificial" and the third group includes the opinion „neither beneficial nor not beneficial". During evaluation of the questionnaire results the MUCL librarians have compared the results on topics with the results from the similar questionnaire filled by the Ph.D. students who had been enrolled in DSVIz01. The comparison was expected to show if the undergraduate and postgraduate students evaluated the topics differently.

As well as the questionnaire the MUCL librarians have analysed the number of occasions the students opened the tutorials and at what times (LMS IS saves this information). The data obtained were used to get detailed information on the tutorial utilization and ascertain the details of the students' study routines.

Results

Respondents

The questionnaire was completed by 113 (48 %) of a requested 233 medical students who had passed the e-learning course VSIV021 from autumn 2008 to autumn 2010. In the context of experience with usual students' lack of interest in questionnaires at MU the low number of responses was expected. Despite this the results represent the opinions of the students from every semester and health discipline (Table 2).

The students of VSIV021

	No. of the students	No. of students according to their study programme (%)		
		General Medicine	Dentistry	Specializations in Health Science (Physiotherapy, Nutritive Therapist etc.)
autumn 2008	43	39,5	2,3	9,3
spring 2009	41	29,3	2,4	2,4
autumn 2009	59	27,1	3,4	3,4
spring 2010	37	37,8	5,4	13,5
autumn 2010	94	29,8	3,2	9,6

Table 2

Satisfaction with the e-learning

Almost all the respondents found time (93,8 %) and space (82,3 %) flexibility to be the main advantage of e-learning. The satisfaction with time and space flexibility has also been confirmed by the students' answers about the timetable of their study. These results (Table 3) show the students mainly studied on the weekend and in the afternoon or evening and the learning wasn't time-consuming.

Most students (68 %) have also been satisfied with studying at their own pace. The online interactive tutorials were considered better than the printed study materials by 58,4 % of the students.

Disadvantages to e-learning have been noted sporadically. Some felt they needed personal contact with classmates (6,2 %) and a teacher (1,8 %), the others were displeased by the necessity of using the computer and Internet (7,1 %), studying only from the interactive tutorials (7,1 %) or passing the final programme test in the library (0,9 %). Some of students (6,2 %) found some tutorials too detailed.

Timetable of students' learning

No. of students studied in concrete day (%)		No. of students studied in the daytime		No. of students studied weekly for	
Monday	14,2	6 - 9 a.m.	1,8	1-2 hours	74,3
Tuesday	12,4	9 - 12 a.m.	9,7	2-4 hours	23,9
Wednesday	11,5	12 - 14 p.m.	5,3	4-6 hours	0,9
Thursday	15,0	14 - 17 p.m.	20,4	6-8 hours	0,0
Friday	12,4	17 - 19 p.m.	38,1	more than 8 hours	0,9
Saturday	30,1	19 - 22 p.m.	49,6		
Sunday	38,9	22 p.m. - 6 a.m.	16,8		

Table 3

The motivation factors for continous study and enrolment in the course

Most students (62,5 %) have said that the gradual release of the study materials was the main motivation for continuous learning. The tasks were considered the motivation factor by 59,7 % of the students. The students (58,3 %) who passed the course before autumn 2010 noted that practical training also motivated them in continuous study.

The need to learn to work with scientific information was proclaimed as the main motivation factor to enrolling in the course by 86,7 % of the students. Some students (35,4 %) confessed to enrolling in the course for the sake of two credits, and 5,3 % of the students were recommended the course by their teachers.

Satisfaction with the Taught Topics

The results (Table 4) show the students were mainly interested in the methodology of searching (90,3 %), especially in the databases Web of Science and Scopus (92,0 %). Higher interest was also seen in topics like medical databases (83,2 %), EndNoteWeb (78,8 %), publication and citation ethics (77,9 %), multidisciplinary full text databases (77 %) or citation style ISO 690 (76,1).

The lower interest was in the non-medical databases (36,3 %), library terminology (34,5 %), scientometric indicators SNIP and SJR (27,5 %) or h-index (16,8 %) and the websites of health organizations (19,5 %).

Benefit of the taught topics (%)						
	Medical students			Ph.D. students		
Taught topic	beneficial	neutral	not beneficial	beneficial	neutral	not beneficial
Web of Science + Scopus	92,0	4,4	2,7	82,5	15,9	1,6
Searching (methodology, boolean operators)	90,3	5,3	3,5	72,1	16,2	11,7
Subject specific databases - medicine	83,2	10,6	3,5	81,0	14,3	4,8
EndNoteWeb	78,8	14,2	4,4	73,0	16,2	9,0
Publication and citation ethics	77,9	12,4	8,8	67,6	18,9	12,6
Multidisciplinary databases	77,0	16,8	4,4	84,7	4,5	9,9
Citation style ISO 690	76,1	14,2	8,8	66,7	23,4	9,9
MU portal on EIR, remote access	68,1	23,9	6,2	52,7	9,9	8,1
Impact factor	68,1	21,2	7,1	73,9	18,0	7,2
Online medical journals and books	62,8	23,0	9,7	x	x	x
Healthy organizations' websites	61,1	16,8	19,5	28,6	44,4	25,4
Catalogues	57,5	26,5	15,0	x	x	x
Interlibrary loan service	55,8	26,5	16,8	36,0	28,8	34,2
H-index	48,7	31,0	16,8	39,7	42,9	11,1
Other databases (IngentaConnect, Ulrich)	43,4	32,7	20,4	x	x	x
Zotero	32,5	45,0	20,0	x	x	x
Library terminology	31,0	33,6	34,5	x	x	x
Researcher ID	30,0	47,5	20,0	x	x	x
SNIP and SJR	27,5	42,5	27,5	77,1	10,4	12,5
Non-medical databases	27,4	33,6	36,3	17,5	44,4	38,1

Table 4 – The symbol X in the cells means the topic wasn't taught for this group.

The Contribution of Tasks

Most of the tasks (Table 5) were evaluated as beneficial, especially the tasks "research" (80,5 %) and "EndNoteWeb" (76,1 %) which had been passed by the students in all terms. The tasks "Metalib" (92,5 %) and "Medline" (87,5 %) received the highest rating (it must be noted these tasks have been implemented in the course since autumn 2010). The students showed the lowest interest in the tasks "scanning" (45 %) and "library catalogue" (35 %).

The contribution of tasks (%)			
Tasks	beneficial	neutral	not beneficial
Metalib	92,5	5,0	5,0

Medline	87,5	2,5	12,5
Search	80,5	15,0	2,7
EndNoteWeb	76,1	16,8	5,3
Impact factor	65,5	31,0	10,6
Interlibrary loan service	56,6	28,3	13,3
Scanning	45,0	37,5	20,0
Catalogue	35,0	27,5	40,0

Table 5

Discussion

Satisfaction with the e-learning

The first hypothesis on the students' satisfaction with the VSIV021 as e-learning has been confirmed. Moreover, the satisfaction with time and space flexibility has been confirmed by the analysis made in the LMS IS. The analysis has shown the students really studied every day, especially on Sunday (Figure 2), and during the day, mainly in the afternoon and evening (Figure 3). These results correspond with the similar outcomes in several studies describing the preference for e-learning of medical students. Keller and Cernerud report the satisfaction of medical students with the time and space flexibility of e-learning, but they also note a critical reaction to technical problems, higher dependence on computers or lack of human contact (Keller and Cernerud, 2002). Reynolds, Rice and Uddin indicate reports of time-saving through e-learning by one third of the students while others disagree or don't know and they found the students had no significant technical problems. (Reynolds *et al.*, 2007). The MUCL librarians also found some criticism of technical problems but the number of dissatisfied students was insignificant.

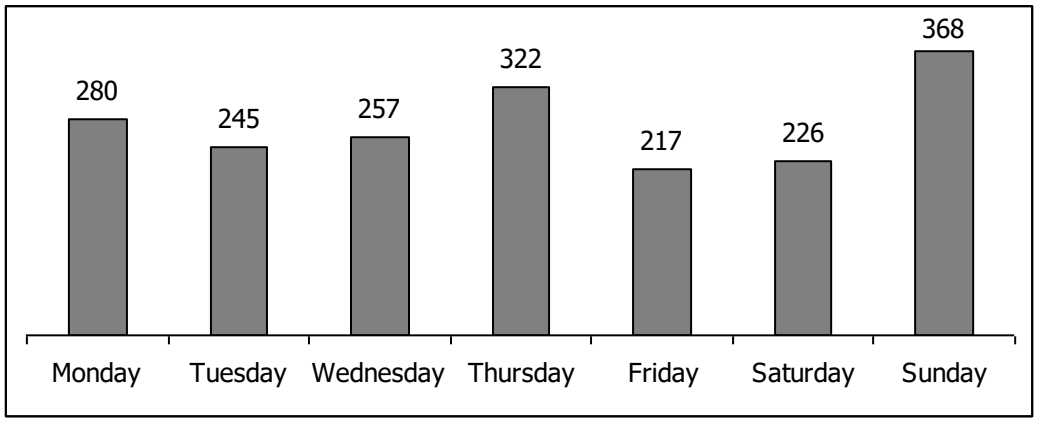

Figure 2 – The amount number of openings the tutorials during the week

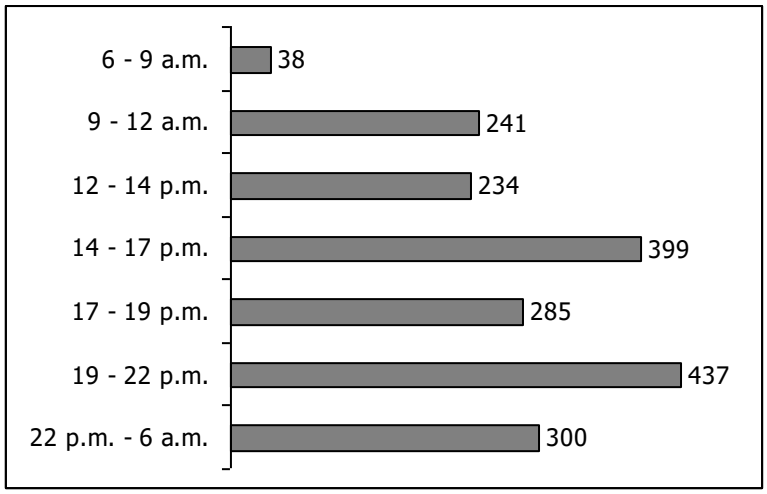

Figure 3 – The number of tutorial openings during the week

The motivation factors for continuous study and enrolling the course

The second and third hypotheses on the motivation factors leading the students to continuous learning have been mostly confirmed. Almost two-thirds of the students reported the gradual publishing of the study materials, tasks and practical trainings as motivation factors. The results correspond to the general requirements for e-learning teaching including the suited LMS supporting the structured syllabus (Conole, 2004; Davis *et al.*, 2008; Ellaway and Masters 2008). However, the MUCL librarians have realized the necessity of continuing to increase motivation and since spring 2011 they have prepared the most sophisticated tasks with better practical usage. Firstly the task on impact factor has been changed to the task on the comparison of the prestige of journals based on impact factor and also on SNIP and SJR (measurement tools in Scopus). Then the librarians prepared the new task on plagiarism consisting of the detection of the plagiarism elements in the short text.

The disproval of the hypothesis that the students enrol in the course in order to obtain credits was surprising for the MUCL librarians because they had thought the students took VSIV021 as a simple way to get credits. It was the comments which especially showed the students are really interested in learning how to search for information (one student's comment "I discovered America" is eloquent enough). At the time of writing this article the number of students enrolling in VSIV021 is continuing to increase and 60 medical students have enrolled the course in spring 2011.

Although almost two-thirds of students reported the practical trainings during the semester as a motivation factor, since autumn 2010 the practical trainings were cancelled because of the low interest the students had in them. The MUCL librarians found adding the new tasks more beneficial which is discussed below.

The low number of students recommended to enrol in VSIV021 by their teacher is comprehensible for the MUCL librarians who realize the most probable main cause of the medical teachers' unfamiliarity with course VSIV021 could be their lack of free time after teaching at the FM and practising medicine in the faculty hospitals.

Satisfaction with the taught topics

The third hypothesis, that the medical students are satisfied with the taught topics, is disputable because only half of the topics were found to be beneficial by two-thirds of the students. The MUCL librarians found the students' interest only in the topics specifically applicable to their study as the main reason for low interest in the topics related to the library terminology and catalogues, databases with less medical full texts (e.g. IngentaConnect, Bio-One etc.) or in the topics relating to scientometry (h-index, SNIP and SJR) and listing the

publications. This conclusion can be supported with the comparison of these results with the results from the similar questionnaire for Ph.D. students who passed the DSVIz01 course. Table 3 shows even if Ph.D. students assessed the taught topics similarly to the medical students, slight differences can be observed.

While the medical students preferred the topic on impact factor, Ph.D. students found SNIP and SJR most important. There can be three reasons for this difference: 1) the medical students were less motivated in SNIP and SJR because they bore no relation to the task while the topic on impact factor is connected with the task, 2) the medical students rarely publish in the journals during their study, 3) Ph.D. students were a little bit more interested in SNIP and SJR than impact factor because the faculty requests they publish in the journals included in Scopus and the calculation method of SNIP and SJR is more sophisticated than that of impact factor. (Falagas *et al.*, 2008; González-Pereiraa *et al.*, 2009; Moed, 2010)

Another significant difference between the medical students and Ph.D. students is related to the databases Web of Science and Scopus. According to the previous interpretation of the results the tasks "search" and "impact factor" are most likely reasons for higher interest of the medical students in both databases.

Another surprising result for the MUCL librarians is a low interest of the students in the topic of Zotero. A higher student interest had been expected as Zotero is free under General Public License. The reason could be the use of different web browsers by the students, while Zotero is supported in Mozilla Firefox. The use of different web browsers was evident from the submitted tasks including the screen-shots displaying the students' searches in the databases.

The low interest in the library topics is significant in spite of their relation to the tasks. Roughly one third of the students found the topics to be beneficial, one third found them to be not beneficial and one third took a neutral stance. The reason for these results is truly disputable and the MUCL librarians find differences in the study year of students to be the only explanation. VSIV021 is enrolled in by students from different study years, so each of them has a separate experience with searching in the library catalogues or using the library services like the interlibrary loan services.

The contribution of tasks

The last hypothesis assumes that all tasks have been found to be useful (Table 5), but in reality it was found that a low interest in the tasks related to library services is evident and this supports the conclusion that there is a lack of interest in library topics. As mentioned above, the tasks Metalib, Medline, Catalogue and Scanning have been added in autumn 2011. The tasks Metalib and Medline have been found significantly beneficial while Catalogue and Scanning were rated lower. The high interest in the two tasks is understandable because the students learned practical skills useable in study, while the tasks concerning catalogue and scanning were beneficial only for first year students (18,1 % of 94 students enrolled in autumn 2010) becoming aquainted with the basic library services.

The lower interest in the tasks impact factor and interlibrary loan service is also understandable owing to the fact, described above, the medical students publish rarely during their study and they will practice the skills on impact factor when they start practising medicine and partake in some research.

Conclusion

The questionnaire results have suggested several important revisions to VSIV021. The students' opinions on e-learning form of VSIV021 and the fact that only two of them had to repeat the final test from autumn 2008 to spring 2010 indicate e-learning is – in accordance with described conditions in the Czech university libraries – a suitable tool to increase the

medical students IL skills. However, the results have also shown the need to revise the conception of the course.

Although almost two-third of students were satisfied with the online study materials the MUCL librarians have decided to prepare some printed material supporting the course. In January 2011 the librarians submitted the workbook to the FM requesting it be published. Even though the workbook has been prepared for the Ph.D. students, it can be usable for students of VSIV021 as well because it contains the essential information on the topics taught in VSIV021 and several trainings.

Judging by the low number of students recommended to enrol in VSIV021 by their teachers the MUCL librarians have decided there is a need to make better publicity for their course among the medical teachers. The necessity of better publicity has been also confirmed by a special questionnaire for the medical teachers. Even if only 51 from 652 requested persons answered, 66 % of 51 teachers will recommend the students enrol in VSIV021. The result indicates if the medical teachers know about VSIV021, they support this activity. It supports the MUCL librarians opinion about improving the publicity of VSIV021 among the teachers

The low interest in some topics has lead the MUCL librarians to 1) create the interactive graphical tutorials explaining the importance of the topics according to the students' needs in the future (especially to topics on scientometry), 2) remove the parts of tutorials describing the library terminology and catalogues, 3) create the tutorial on writing a scientific paper. The librarians have also started to revise the tutorials – some tutorials on databases have been abridged, buttons for moving to the previous screen have been implemented etc.

Despite the low student interest in the tasks on catalogue and scanning, the tasks haven't been cancelled because the MUCL librarians have repeatedly found students unable to search the catalog and use the scanner and these tasks are not time-consuming. Another planned change concerns the task of search, where the students will be searching the articles not in Web of Science, but in Metalib. The purpose of the task is to get better practice in searching with the Boolean operators and finding the articles on the students' own topic across various databases. As mentioned above, the task on impact factor will also be changed and the students will be requested to assess a text in accordance with the measurement tools in Web of Science and Scopus which is a more prestigous journal.

Besides these tasks two new tasks have been added since spring 2011. The first one is based on verifying online access to the full text of journals via MU which leads the students to realize the full texts are available in more databases, not only in Medline. The second task relates to the topic of plagiarism and the students will be requested to find signs of plagiarism in a short text (e.g. missing citation). The main goal of the task is to ensure the student will better recognize the signs of plagiarism. The task on Zotero has been also discussed by the MUCL librarians and finally it was decided it should no longer be examined because of possible technical problems from different web browsers used by the students.

All described plans and changes confirm e-learning is a specific type of education that must be repeatedly analysed. As mentioned above in "background", the MUCL librarians realize the specifics of e-learning and its disadvantages but the several studies comparing pre-test and final exam scores of graduates from online courses show e-learning education can improve the student skills, even if not as much as F2F or hybrid learning (Kraemer *et al.*, 2007; Nichols *et al.*, 2003; Reynolds *et al.*, 2007; Salisbury and Ellis 2003; Yu *et al.*, 2007). Accordingly the MUCL librarians found only two students enrolled in the courses between autumn 2008 and spring 2010 had to repeat the final tests.

In the context of conditions in which the MUCL librarians make their IL activities, e-learning has seemed to be a possible way of improving the IL skills of the medical students without increasing the time spent by the librarians in the teaching. In accordance with these

explanations all results from questionnaires and analyses should be interpreted as detailed feedback on VSIV021 that can advise the other health librarians preparing e-learning courses on the IL to avoid mistakes and problems faced by the MUCL librarians.

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